

## Test

1

Total mark

10

(8 marks)

**Answer the following questions :**

**A Choose the correct answer :**

- 1 Any lever consists of .....
  - (a) a resistance force (R) only.
  - (b) an effort force (F) only.
  - (c) a fulcrum (O) only.
  - (d) (a) , (b) and (c).
- 2 Which of the following levers doesn't save effort ? .....
  - (a) Coal holder.
  - (b) Nutcraker.
  - (c) Wheelbarrow.
  - (d) Bottle opener.
- 3 The 1<sup>st</sup> class lever differs from the 2<sup>nd</sup> class lever in .....
  - (a) the absence of the effort force.
  - (b) the presence of a fixed point.
  - (c) the position of fulcrum.
  - (d) (a) and (b).
- 4 The type of levers which always doesn't save effort is the .....
  - (a) first class levers.
  - (b) second class levers.
  - (c) third class levers.
  - (d) (a) and (b).

**B In a 2<sup>nd</sup> class lever, if the effort force is 100 Newton, the length of the force arm is 25 cm and the resistance force is 500 Newton.**

**Calculate the length of the resistance arm.**

(2 marks)

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## Test

## 2

Total mark

10

## Answer the following questions :

## A Choose the correct answer :

(8 marks)

- 1 Soda water opener is a ..... class lever.
- (a) first (b) second  
(c) third (d) fourth
- 2 The distance between the resistance force and fulcrum is known as .....
- (a) the arm of force. (b) the arm of resistance.  
(c) the arm of force + the arm of resistance.  
(d) the arm of force – the arm of resistance.
- 3 Which of the following levers has the arm of force longer than the arm of resistance ? .....
- (a) Manual broom. (b) Ice holder.  
(c) Stapler. (d) Tweezers.
- 4 All the following tools are from the third class levers, except .....
- (a) wheelbarrow. (b) fishing tool.  
(c) manual broom. (d) sweet holder.

## B Give a reason for the following :

(2 marks)

The seesaw is considered as a lever.

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## Test

3

Total mark

10

## Answer the following questions :

## A Choose the correct answer :

(8 marks)

1 Crowbar is considered from ..... class levers.

- (a) first (b) second  
(c) third (d) fourth

2 Which of the following figures represents the third class lever ? .....



3 When the arm of force equals 8 cm. and the arm of resistance equals 4 cm.,

so .....

- (a) the effort force = the resistance force.  
(b) the effort force > the resistance force.  
(c) the resistance force < the effort force.  
(d) the effort force < the resistance force.

4 The distance between the effort force and fulcrum is .....

- (a) the effort force. (b) the resistance arm.  
(c) the effort force arm. (d) the resistance force.

## B What happens when ...?

(2 marks)

The resistance arm of a lever is equal to its force arm.

.....

.....



## Test

## 4

Total mark

10

## Answer the following questions :

## A Choose the correct answer :

(8 marks)

- 1 The law of levers states that .....
- (a) force  $\times$  its arm = resistance  $\times$  its arm.  
(b) force  $\div$  its arm = resistance  $\div$  its arm.  
(c) force + its arm = resistance + its arm.  
(d) force  $\times$  its arm = resistance + its arm.
- 2 All the following levers don't save effort, except .....
- (a) nutcracker. (b) ice holder.  
(c) fishing tool. (d) hockey bat.
- 3 In the ....., the effort force is between the resistance force and fulcrum.
- (a) third class levers only  
(b) first class levers only  
(c) second class levers only  
(d) first and second class levers
- 4 Which of the following is a second class lever ? .....
- (a) Sweet holder. (b) Wheelbarrow.  
(c) Seesaw. (d) Hockey bat.

## B A force of 500 Newton affects a lever of the first order and its force arm is 20 cm.

Calculate the resistance given that the arm of the resistance equal 50 cm. (2 marks)

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## Test

5

Total mark

10

## Answer the following questions :

## A Choose the correct answer :

(8 marks)

- 1 All the following are from the first class levers, except .....
- (a) crowbar. (b) scissors.  
(c) nutcracker. (d) seesaw.
- 2 Tweezers are used to .....
- (a) move a heavy load. (b) increase the speed of the ball.  
(c) pick up very small objects. (d) hold ice cubes.
- 3 When the length of the force arm equals 2.5 metre and the length of the resistance arm equals 1.5 metre, so all the following answers are correct, except .....
- (a) the resistance force is larger than the effort force.  
(b) the lever has a mechanical benefit.  
(c) this lever saves effort.  
(d) this lever doesn't save effort.
- 4 The effort force and resistance force are measured in .....
- (a) Newton. (b) metre.  
(c) centimetre. (d) kilometre.

## B Give a reason for the following :

(2 marks)

The second class levers always save effort.

.....

.....

## Answers of Test

1

A 1 (d)

2 (a)

3 (c)

4 (c)

B The effort force  $\times$  its arm = The resistance force  $\times$  its arm

$$100 \times 25 = 500 \times \text{its arm}$$

$$\text{The length of the resistance arm} = \frac{100 \times 25}{500} = 5 \text{ cm.}$$

## Answers of Test

2

A 1 (b)

2 (b)

3 (c)

4 (c)

B Because it consists of a rigid bar that rotates around a fixed point called fulcrum, and it is affected by an effort force and a resistance force.

## Answers of Test

3

A 1 (a)

2 (c)

3 (d)

4 (c)

B The effort force and the resistance force are equal, so this lever doesn't conserve effort.

## Answers of Test

4

A 1 (a)

2 (a)

3 (a)

4 (b)

B The effort force  $\times$  its arm = The resistance force  $\times$  its arm

$$500 \times 20 = \text{The resistance force} \times 50$$

$$\text{The resistance force} = \frac{500 \times 20}{50} = 200 \text{ Newton.}$$

## Answers of Test

5

A 1 (c)

2 (c)

3 (d)

4 (a)

B Because in the second class levers, the effort arm is always longer than the resistance arm, so the effort force is always smaller than the resistance force.



Total mark  
25

## Unit one

## Lesson 1

## Worksheet 1

Answer each of the following questions :

## 1. Complete the following statements : (5 marks)

- The crowbar is considered a ..... class lever but the ..... is a third class lever.
- In the second class lever, the ..... lies between ..... and .....
- Hockey bat is a lever that used to increase the ..... of the ball.
- Wheelbarrow and nutcracker have the ..... between fulcrum and .....
- ..... are levers that used to pick up the very small objects, while ..... is a lever that used to move the object for a longer distance.

## 2. [A] Give reasons for : (5 marks)

- Levers are very important in our daily life.

- Seesaw is considered as a first class lever.

## [B] Correct the underlined words :

- Second class levers are the most popular type of levers in our daily life. (.....)
- Coal holder is a first class lever. (.....)
- In the third class lever, the fulcrum lies between the effort force and the resistance force. (.....)

## 3. Put the symbols shown in the opposite table in the right order to illustrate the different types of levers in fig. (1), fig. (2) and fig.(3) : (5 marks)




Item	Symbol
Fulcrum	
Effort force	
Resistance force	

Fig. (1)  
First class leverFig. (2)  
Second class leverFig. (3)  
Third class lever



## Worksheets

## 4. [A] What is meant by ... ?

(5 marks)

1. The lever.

2. Third class lever.

## [B] Write the scientific term :

1. The fixed point at which the lever rotates.

( ..... )

2. Levers that have fulcrum between the effort force and resistance force.

( ..... )

3. Levers that have the resistance force between the effort force and fulcrum.

( ..... )

## 5. Classify the following levers according to their type in the table below : (5 marks)

Pincers – Tweezers – Nail clippers – Bottle opener – Stapler – Ice holder – Nutcracker – Hammer claw – Fishing tool.

First class levers	Second class levers	Third class levers
.....	.....	.....
.....	.....	.....
.....	.....	.....



## Unit one

## Lesson 2

Total mark  
25

## Worksheet 2

Answer each of the following questions :

## 1. Complete the following statements :

(5 marks)

1. In the second class levers, the arm of ..... is always longer than the arm of .....
2. Effort force  $\times$  ..... = .....  $\times$  .....
3. The ..... class levers always don't save effort.
4. A lever has a mechanical benefit when ..... is longer than .....
5. In the third class lever, the ..... force always greater than ..... force.

## 2. [A] What happens if ... ?

(5 marks)

1. The effort arm is longer than the resistance arm.  
.....

2. The amount of effort force is equal to the amount of resistance force.  
.....

3. The length of effort arm is half the length of resistance arm.  
.....

## [B] Correct the underlined words :

1. Levers of the second class always have no mechanical benefit.

( ..... )

2. The effort arm is always longer than the resistance arm  
in the third class lever.

( ..... )

## 3. Solve the following problems :

(5 marks)

1. The length of effort arm of a crowbar is 160 cm, and the length of resistance arm is 60 cm. If the value of effort force equals 30 Newton.

Calculate the value of resistance force and mention the type of this lever.

.....

.....

.....



## Worksheets

2. In a first class lever, the resistance force equals 60 Newton. Calculate the length of the resistance arm. (knowing that the effort force  $\times$  its arm equal 300).

.....

.....

.....

4. Compare between the three types of levers : (5 marks)

Points of comparison	First class levers	Second class levers	Third class levers
1. Definition :	.....	.....	.....
2. Conservation of effort :	.....	.....	.....
3. Example :	.....	.....	.....

5. [A] Write the scientific term : (5 marks)

- The distance between the resistance force and fulcrum. (.....)
- The distance between the effort force and fulcrum. (.....)

- [B] Determine by drawing the number of weights which must be placed at a distance of one hole of fulcrum to become the lever balance, where the distance between every two holes is 1 cm.

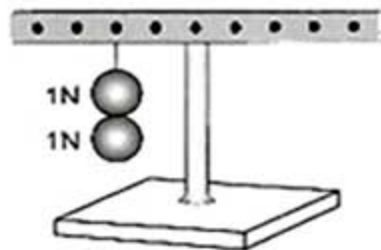


Fig. (a)

.....

.....

.....

.....

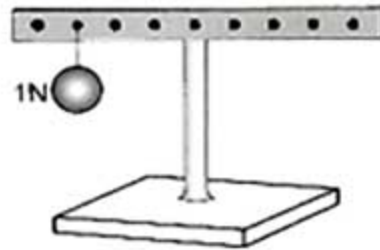


Fig. (b)

.....

.....

.....

.....



## General Exercise of the School Book on

## 1. Match column (A) with its correspondence in column (B):

(A)	(B)
1. Levers that always conserve the effort.	a. First class levers.
2. Levers that not conserve the effort.	b. Second class levers.
3. Levers that sometimes conserve the effort.	c. Third class levers.
4. A fixed point that a rigid bar rotates around.	d. The lever.
5. A rigid bar rotates around a fixed point, and is affected by a force and a resistance.	e. The force.
	f. The resistance.
	g. The fulcrum.

1. .... 2. .... 3. ....  
4. .... 5. .... 6. ....

## 2. Put (✓) or (x) in front of each of the following sentences and correct the false ones :

1. The first class levers have the resistance between the force and the fulcrum. ( )  
.....  
2. The second class levers have the force between the resistance and the fulcrum. ( )  
.....  
3. The third class levers have the fulcrum between the force and the resistance. ( )  
.....  
4. The crowbar is an example of the first class levers. ( )  
.....  
5. If the arm of force is shorter than the arm of resistance, then the lever conserves effort. ( )  
.....

## 3. Complete the following sentences :

1. The nutcracker is an example of the ..... levers.  
2. The manual broom is an example of the ..... levers.  
3. The scissors are example of the ..... levers.  
4. Force  $\times$  its arm = .....  $\times$  .....  
5. The type of the levers where the arm of force and the arm of resistance are equal is .....



## Worksheets

4. Compare between the three types of levers using the following table :

Points of comparison	First class lever	Second class lever	Third class lever
Definition :	..... ..... .....	..... ..... .....	..... ..... .....
Conservation of effort :	.....	.....	.....
Examples :	..... .....	..... .....	..... .....

5. Classify the following tools according to the type of lever :



1. ....



2. ....



3. ....



4. ....



5. ....



6. ....

6. The affecting force on a second class lever equals 200 Newton and the length of its arm is 50 cm. if the value of the resistance force 1000 Newton, calculate the value of the arm of resistance.

.....  
.....

7. The length of the force arm of a third class lever is 5 cm, and the length of the arm of the resistance is 15 cm. if the resistance force has a value of 300 Newton, calculate the value of the affecting force

.....  
.....



## Model Exam

1

## on Unit one

Total mark

25

Answer each of the following questions :

## 1. Complete the following statements :

(5 marks)

1. Levers make tasks easier by means of ..... and .....
2. Nutcracker has a mechanical benefit, because ..... is longer than .....
3. Water pump is considered a ..... class lever, while the manual broom is ..... class lever.
4. In the third class levers, the ..... is between the fulcrum and .....
5. The resistance arm is the distance between ..... and .....

## 2. [A] Give reasons for :

(5 marks)

1. Crowbar and tweezer are levers.

2. The second class levers always save effort.

## [B] Write the scientific term :

1. The most popular type of levers in our daily Life. ( ..... )
2. A force that increases when the resistance arm is longer than the effort force arm. ( ..... )
3. They are simple machines that always save effort. ( ..... )

## 3. Choose the correct answer :

(5 marks)

1. All the following are from the first class levers except .....  
a. the crowbar.      b. the scissors.      c. the nutcracker.      d. the seesaw.
2. Sweet holder is from the ..... class levers.  
a. first      b. second      c. third      d. fourth
3. When the arm of resistance ..... the arm of force, the effort force equals the resistance force.  
a. >      b. <      c. =      d. ≠



## Worksheets

4. All the following are from the importance of levers except .....
- increasing force.
  - decreasing speed.
  - increasing speed.
  - increasing distance.
5. Which of the following levers doesn't save effort ? .....
- Nutcracker.
  - Stapler.
  - Manual broom.
  - Wheelbarrow.

## 4. [A] What happens when ... ?

(5 marks)

- The force arm is shorter than the resistance arm in the lever.  
.....
- Both of resistance arm and effort force arm equal 5 meters.  
.....

## [B] Correct the underlined words :

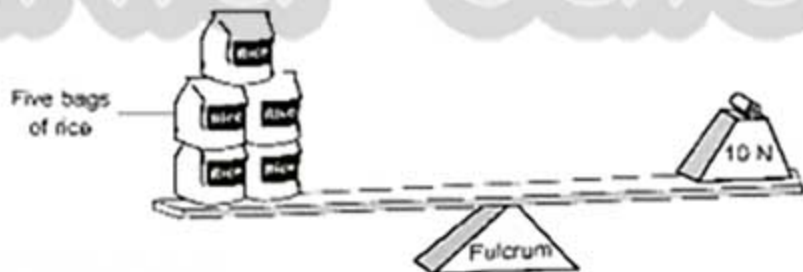
- Wheelbarrow is a first class lever. (.....)
- Coal holder is used to increase distance. (.....)
- The third class levers always save effort. (.....)

## 5. [A] Mention one example of lever used for :

(5 marks)

- Moving force from one place to another ; .....
- Accuracy in performance ; .....

[B] The following figure shows five identical bags of rice are balanced with an effort force equals 10N.



## Choose the correct answer :

- Each bag of rice is balanced with an effort force equals .....

  - 1N.
  - 2N.
  - 10N.
  - 5N.

- If we remove one bag of rice, So the remained four bags of rice are balanced with an effort force equals .....

  - 10N.
  - 2N.
  - 4N.
  - 8N.

(Note : the place of fulcrum is fixed and can not be changed.)



## Model Exam

2

## on Unit one

Answer each of the following questions :

## 1. [A] Choose the correct answer :

(5 marks)

- Resistance arm is sometimes equal to force arm in ..... class levers.  
a. first      b. second      c. third      d. first and third
- ..... is considered from first class levers.  
a. Nutcracker      b. Hammer claw      c. Ice holder      d. Fishing tool
- Which of the following levers is used to avoid dangers ? .....  
a. Tweezers.      b. Sweet holder.      c. Coal holder.      d. Scissors.

## [B] Give reasons for :

- Nutcracker is considered as an increasing force lever.  
.....
- The third class levers always don't conserve effort.  
.....

## 2. [A] Write the scientific term :

(5 marks)

- The type of levers that its mid point is the resistance force. ( ..... )
- Force  $\times$  its arm = Resistance  $\times$  its arm. ( ..... )
- A type of levers, where the effort force may be larger or smaller than the resistance force. ( ..... )

## [B] What is meant by ... ?

- Fulcrum.  
.....
- The effort force arm.  
.....

## 3. Complete the following statements :

(5 marks)

- When the arm of force is equal to the arm of resistance, then ..... is equal to .....
- The factors that determine the values of force and resistance are ..... and .....



## Worksheets

3. There is a conservation of effort in the first class levers if ..... is longer than .....
4. Stapler has the ..... between fulcrum and .....
5. When the length of each of the effort arm and the resistance arm equals 8 cm. and the resistance = 5 Newton, so the effort force equals .....

4. Put (✓) or (x) in front of each of the following sentences and correct the false ones : (5 marks)

1. Bottle opener, wheelbarrow and paddle are examples of second class levers. ( )
2. Hockey bat and tweezers have a mechanical benefit. ( )
3. The effort force arm is meseasured in Newton. ( )
4. Among the functions of levers is to decrease the speed. ( )
5. The resistance arm is the distance between the resistance force and fulcrum. ( )

5. [A] A force of 360 Newton and an arm of length 4 cm affect on a lever. (5 marks)

If the value of resistance equals 200 Newton, determine the location of the resistance to balance the lever.

[B] Choose from column (B) what suits it in column (A).

(A)	(B)
1. Levers always save effort.	a. Lever.
2. Levers always don't save effort.	b. Force.
3. Levers sometimes save effort.	c. Third class.
4. A rigid bar rotates around a fixed point and is affected by a force and a resistance.	d. Second class.
	e. First class.

1. ....
2. ....
3. ....
4. ....





# ALADWAA

## Gem



## Science

### الصف 6 الابتدائي

مقترح النماذج الاسترشادية لشهر نوفمبر

العام الدراسي 2022 - 2023

## Model (1)

10  
Marks

### (A) Choose the correct answer:

1 ..... is/are considered first class lever.

- a. Wheelbarrow
- b. Pliers
- c. Manual broom
- d. Ice holder

2 ..... is a fixed point that a rigid bar sits on.

- a. Force
- b. Fulcrum
- c. Resistance
- d. No correct answer

3 ..... is one of the functions of levers.

- a. Increasing force
- b. Decreasing distance
- c. Decreasing speed
- d. Increasing temperature

4 Which of the following levers saves effort? - .....

- a. Scissors
- b. Nutcracker
- c. Sweet holder
- d. Coal holder

### (B) Answer the following problem:

A third class lever with a force arm of length 2 cm, and the length of the arm of the resistance is 6 cm. If the resistance has a value of 20 newtons, calculate the value of the affecting force and mention if this lever conserves effort or not. And why?

#### Solution:

.....

.....

.....

## Model (2)

10  
Marks

### (A) Choose the correct answer:

1 The effort arm and the resistance arm are measured in ..... or .....

a) m, cm

b) kg, gram

c) ton, kg

d) L, ml

2 Which of the following is from the second class levers? - .....

a) Seesaw

b) Wheelbarrow

c) Sweet holder

d) Manual broom

3 Which lever does not conserve effort? - .....

a) Wheelbarrow

b) Nutcracker

c) Manual broom

d) Bottle opener

4 The distance between the resistance force and the fulcrum is called .....

a) the arm of resistance

b) the arm of force

c) the arm of the lever

d) the fulcrum

### (B) Give a reason for:

The force may be equal to the resistance in the first-class levers.

.....



## Model (3)

10  
Marks

### (A) Choose the correct answer:

- 1 The law of levers states that ..... .
- a. Effort force + its arm = resistance force + its arm
  - b. Effort force  $\times$  its arm = resistance force  $\div$  its arm
  - c. Effort force  $\times$  its arm = resistance force  $\times$  its arm
  - d. Effort force  $-$  its arm = resistance force  $\times$  its arm
- 2 The factors that determine the values of the effort force and the resistance force in a lever are ..... .
- a. the arm of the force
  - b. the arm of the resistance
  - c. the position of the fulcrum
  - d. (a) and (b)
- 3 The force that is exerted to equilibrate the resistance is called ..... force.
- a. fulcrum
  - b. effort
  - c. friction
  - d. (a) and (b)
- 4 ..... is/are used to pick up very small objects.
- a. Coal holder
  - b. Tweezers
  - c. Manual broom
  - d. Seesaw

### (B) What happens when ...?

The arm of resistance is longer than the arm of force of a lever.

..... .

## Model (4)

10  
Marks

### (A) Choose the correct answer:

- 1 The lever saves effort when .....
  - a. the arm of force is less than the arm of resistance
  - b. the arm of force is equal to the arm of resistance
  - c. resistance equals force
  - d. the arm of force is longer than the arm of resistance
- 2 The lever that has the fulcrum between the force and the resistance is .....
  - a. first
  - b. second
  - c. third
  - d. first and second
- 3 When the arm of force is longer than the arm of resistance, the effort force is ..... the resistance force.
  - a. larger than
  - b. smaller than
  - c. double
  - d. equal to
- 4 ..... have the effort force between the resistance force and the fulcrum.
  - a. 3rd class levers
  - b. 2nd class levers
  - c. 4th class levers
  - d. (b) and (c)

### (B) Mention one function of levers in:

- 1 Tweezers: .....
- 2 Hockey bat: .....



## Model (5)

10  
Marks

### (A) Choose the correct answer:

- 1 The 1st class lever differs from the 2nd class lever in ..... .  
 a. the absence of the effort force      b. the presence of a fixed point  
 c. the position of the fulcrum      d. (a) and (b)
- 2 All the following are levers that save effort except the ..... .  
 a. crowbar      b. nutcracker      c. wheelbarrow      d. ice holder
- 3 To move a heavy stone, we use ..... .  
 a. wheelbarrow      b. crowbar      c. pliers      d. scissors
- 4 Second class levers always save effort because the length of the arm force is .....  
 the length of the arm of resistance.  
 a. equal to      b. longer than      c. shorter than      d. No correct answer

### (B) Compare between the following:

Points of comparison	2 <sup>nd</sup> class levers	3 <sup>rd</sup> class levers
Definition	..... ..... .....	..... ..... .....
Examples	..... ..... .....	..... ..... .....

## Model (1) Answers

10  
Marks

### (A) Choose the correct answer:

1 ..... is/are considered first class lever.

- a. Wheelbarrow
- b. Pliers
- c. Manual broom
- d. Ice holder

2 ..... is a fixed point that a rigid bar sits on.

- a. Force
- b. Fulcrum
- c. Resistance
- d. No correct answer

3 ..... is one of the functions of levers.

- a. Increasing force
- b. Decreasing distance
- c. Decreasing speed
- d. Increasing temperature

4 Which of the following levers saves effort? - .....

- a. Scissors
- b. Nutcracker
- c. Sweet holder
- d. Coal holder

### (B) Answer the following problem:

A third class lever with a force arm of length 2 cm, and the length of the arm of the resistance is 6 cm. If the resistance has a value of 20 newtons, calculate the value of the affecting force and mention if this lever conserves effort or not. And why?

#### Solution:

Force X its arm = Resistance X its arm

..... X 2 = 20 x 6 =  $\frac{20 \times 6}{2}$  = 60 N (doesn't save effort) because effort force is bigger than resistance force.



## Model (2) Answers

10  
Marks

### (A) Choose the correct answer:

1 The effort arm and the resistance arm are measured in ..... or .....

a) m, cm

b) kg, gram

c) ton, kg

d) L, ml

2 Which of the following is from the second class levers? - .....

a) Seesaw

b) Wheelbarrow

c) Sweet holder

d) Manual broom

3 Which lever does not conserve effort? - .....

a) Wheelbarrow

b) Nutcracker

c) Manual broom

d) Bottle opener

4 The distance between the resistance force and the fulcrum is called .....

a) the arm of resistance

b) the arm of force

c) the arm of the lever

d) the fulcrum

### (B) Give a reason for:

The force may be equal to the resistance in the first-class levers.

..... Because the force arm sometimes equals to the resistance arm in the first-class lever .....

## Model (3) Answers

10  
Marks

### (A) Choose the correct answer:

- 1 The law of levers states that ..... .
- a. Effort force + its arm = resistance force + its arm
  - b. Effort force  $\times$  its arm = resistance force  $\div$  its arm
  - c. Effort force  $\times$  its arm = resistance force  $\times$  its arm
  - d. Effort force – its arm = resistance force  $\times$  its arm
- 2 The factors that determine the values of the effort force and the resistance force in a lever are ..... .
- a. the arm of the force
  - b. the arm of the resistance
  - c. the position of the fulcrum
  - d. (a) and (b)
- 3 The force that is exerted to equilibrate the resistance is called ..... force.
- a. fulcrum
  - b. effort
  - c. friction
  - d. (a) and (b)
- 4 ..... is/are used to pick up very small objects.
- a. Coal holder
  - b. Tweezers
  - c. Manual broom
  - d. Seesaw

### (B) What happens when ...?

The arm of resistance is longer than the arm of force of a lever.

The effort force will be bigger than resistance force and the lever doesn't save effort.



## Model (4) Answers

10  
Marks

### (A) Choose the correct answer:

- 1 The lever saves effort when ..... .
- a. the arm of force is less than the arm of resistance
  - b. the arm of force is equal to the arm of resistance
  - c. resistance equals force
  - d. the arm of force is longer than the arm of resistance
- 2 The lever that has the fulcrum between the force and the resistance is ..... .
- a. first
  - b. second
  - c. third
  - d. first and second
- 3 When the arm of force is longer than the arm of resistance, the effort force is ..... the resistance force.
- a. larger than
  - b. smaller than
  - c. double
  - d. equal to
- 4 ..... have the effort force between the resistance force and the fulcrum.
- a. 3rd class levers
  - b. 2nd class levers
  - c. 4th class levers
  - d. (b) and (c)

### (B) Mention one function of levers in:

- 1 Tweezers: ..... • Accuracy in performance
- 2 Hockey bat: ..... • Increasing speed

## Model (5) Answers

10  
Marks

### (A) Choose the correct answer:

- 1 The 1st class lever differs from the 2nd class lever in ..... .  
 a. the absence of the effort force      b. the presence of a fixed point  
 c. **the position of the fulcrum**      d. (a) and (b)
- 2 All the following are levers that save effort except the ..... .  
 a. crowbar      b. nutcracker      c. wheelbarrow      d. **ice holder**
- 3 To move a heavy stone, we use ..... .  
 a. wheelbarrow      b. **crowbar**      c. pliers      d. scissors
- 4 Second class levers always save effort because the length of the arm force is .....  
 the length of the arm of resistance.  
 a. equal to      b. **longer than**      c. shorter than      d. No correct answer

### (B) Compare between the following:

Points of comparison	2 <sup>nd</sup> class levers	3 <sup>rd</sup> class levers
<b>Definition</b>	The lever where the resistance force lies between the effort force and the fulcrum	The lever where the effort force lies between the resistance force and the fulcrum
<b>Examples</b>	Such as wheelbarrow, nutcracker and bottle opener	Such as tweezers, hockey bat, coal holder, fishing hook and manual broom



# Unit 1 Force and Motion

Lesson 1

## Types of levers

Answer Guide P. 15

### Worksheet 1

#### 1 A) Write the scientific term for each of the following:

1. A rigid bar that rotates on a fixed point and is affected by the force and the resistance. (.....)
2. A fixed point on which a rigid bar rotates. (.....)
3. The force that is exerted by a person to overcome the resistance. (.....)
4. The force which results from the weight of an object we want to move. (.....)

#### B) Give a reason for each of the following:

1. Crowbar is considered an increasing force lever.  
.....
2. Doctors and watchmakers use tweezers as a lever.  
.....

#### 2 A) Complete the following sentences:

1. The scientist ..... was the first who invented levers to facilitate tasks.
2. The simple machine that is composed of a bar and helps to perform tasks easily is called .....
3. .... and ..... are examples of levers.
4. .... and ..... are from the benefits of levers.
5. The lever consists of ..... and .....

#### B) Put (✓) or (X) in front of each sentence:

1. Levers are the most common, simple machines. ( )
2. The rigid bar of a lever is affected by three forces. ( )
3. From the functions of levers is to decrease speed. ( )





## Worksheets &amp; Exams

## 3 A) Determine the function of each of the following:

1. Ice holder

2. Tweezers

3. Hockey bat

4. Nutcracker

5. Crowbar

6. Manual broom

## B) Correct the underlined words:

1. Hockey bat is an example of increasing distance levers. (.....)
2. Some of the levers allow the increase in the speed of the objects that we inflict on as in the manual broom. (.....)
3. Tweezers and a hockey bat save the exerted effort. (.....)
4. Crowbar is an example of using levers to avoid dangers. (.....)

## 4 A) Choose the correct answer:

1. The force that is exerted to equilibrate the resistance is called .....  
a. fulcrum                      b. effort                      c. friction
2. Which of the following levers is used to transfer force from one place to another?  
.....  
a. Manual broom.              b. Scissors.              c. Stapler.
3. All the following are among functions of levers except .....  
a. increasing speed              b. increasing size              c. increasing force

## B) What would happen if we did not have levers?

.....

.....

.....

.....

.....

.....



## Worksheet 2

## 1 A) Choose the correct answer:

1. Nutcracker is a ..... class lever.

(first – second – third)

2. Tweezers are used to .....

(increase force – pick up minute objects – increase speed)

3. Levers were first described by .....

(Newton – Einstein – Archimedes)

4. To move a heavy stone, we use .....

(wheelbarrow – crowbar – pliers)

## B) Give a reason for each of the following:

1. Nail clippers are a first class lever.

.....

2. Wheelbarrow is a second class lever.

.....

## 2 A) Complete the following sentences:

1. In the first class levers, the ..... lies between ..... and .....

2. .... is the most popular type of levers in our daily life.

3. Crowbar is a ..... class lever, while ..... is a third class lever.

4. From the examples of levers that are used to avoid dangers is .....

## B) Mention four functions of levers.

.....

.....

.....

.....





## Worksheets &amp; Exams

## 3 A) Correct the underlined words:

1. Cool holder is a first class lever. (.....)
2. The fulcrum lies between the effort force and the resistance force in the third class lever. (.....)
3. Manual broom is one of the second class levers. (.....)
4. The fulcrum is always between the effort force and the resistance force. (.....)

## B) Identify the type of the lever.



a. ....



b. ....



c. ....



d. ....

## 4 A) Put (✓) or (X) in front of each sentence:

1. The fulcrum in scissors lies between the effort force and the resistance force. ( )
2. A lever is affected by effort force only. ( )
3. Manual broom is used in increasing distance and transferring force. ( )
4. Levers are not useful. ( )

## B) What is meant by ...?

1. The first class levers.

.....

2. The second class levers.

.....

3. The third class levers.

.....



## 2

## Law of levers

Answer Guide P. 15

## Worksheet 3

## 1 A) Complete the following sentences:

1. Force  $\times$  its arm = .....  $\times$  .....
2. If the arm of force is shorter than the arm of resistance, then the effort force is ..... than the resistance force.
3. .... is the distance between the effort force and the fulcrum.
4. .... is the distance between the resistance force and the fulcrum.
5. The effort force and the resistance are measured in .....

## B) Put (✓) or (X) in front of each sentence:

1. When the effort arm is longer than the resistance arm, the lever saves effort. ( )
2. The resistance arm is measured in meter. ( )

## 2 A) Write the scientific term for each of the following:

1. Levers that always save effort. (.....)
2. The product of effort force multiplied by its arm equals the product of resistance multiplied by its arm. (.....)
3. A lever is used to carry out jobs accurately. (.....)

## B) What happens in the following cases?

1. The arm of force is longer than the arm of resistance.  
.....  
.....
2. The arm of force is shorter than the arm of resistance.  
.....  
.....





## Worksheets &amp; Exams

## 3 A) Give a reason for each of the following:

1. In the second class levers, the effort force is always less than the resistance force.

2. Sometimes the first class levers save effort.

3. The third class levers are very important although they don't conserve effort.

## B) Match the sentences in column (A) with the correct sentences in column (B):

(A)	(B)
1. The first class levers	a. levers that always save effort.
2. The second class levers	b. levers that never save effort.
3. The third class levers	c. levers that sometimes save effort.
4. The lever	d. is a fixed point on which the rigid bar rotates.
5. The fulcrum	e. is a rigid bar that moves around a fixed point and is affected by effort force and resistance force.

1. .... 2. .... 3. .... 4. .... 5. ....

## 4 A) A first class lever is affected by a force of 500 Newton with an arm length of 20 cm and has a resistance of 200 Newton. Calculate the length of the arm of resistance.

B) A force of 5000 Newton is affecting a lever where the arm of force is 20 m, the resistance is 10000 Newton and the arm of resistance is 5 m. Determine if the lever is balanced or not.



## Worksheet 4

## 1 A) Complete the following sentences:

1. If the effort force equals 20 N, the resistance is 8 N and the effort arm = 4 cm, then the resistance arm equals .....
2. A lever saves effort when the arm of ..... is longer than the arm of .....
3. The third class levers ..... effort, while the second class levers ..... effort.

## B) Write the scientific term of each of the following:

1. The distance between the resistance force and the fulcrum. (.....)
2. They are simple machines that always save effort. (.....)
3. Levers that sometimes save effort. (.....)

## 2 A) A second class lever is affected by a force of 100 Newton, with a force arm of 40 cm. The lever has also a resistance of 200 Newton. Calculate the length of the resistance arm.

.....

.....

## B) Compare between the three types of levers.

P.O.C	First class levers	Second class levers	Third class levers
Definition			
Locations of F, O, R			
Effort force arm and resistance arm			
Saving effort			
Benefits			
Examples			



## Worksheets &amp; Exams

- 3 A) A balanced lever is affected by a resistance that equals 30 Newton with an arm of length 2 cm. Calculate the value of the force needed of the other end of a distance 3 cm from the fulcrum.**
- .....
- .....

**B) What is meant by ...?**

1. A lever is an effort-saving machine.
- .....

2. A lever is not an effort-saving machine.
- .....

- 4 A) Give a reason for each of the following:**

1. Some of the first class levers conserve effort but others do not.
- .....

2. Wheelbarrow has a mechanical benefit.
- .....

3. Coal holder does not have a mechanical benefit.
- .....

**B) Match column (A) with what suits in column (B):**

(A)	(B)
1. First class levers	a) always conserve effort.
2. Second class levers	b) sometimes conserve effort.
3. Third class levers	c) never conserve effort.

1. ....

2. ....

3. ....



# School BOOK Exercises

on Unit 1

Answer Guide P. 16

## 1 Match column (A) with its correspondence in column (B):

	Column (A)
1	First class levers
2	Second class levers
3	Third class levers
4	The levers
5	The force
6	The resistance
7	The fulcrum

	Column (B)
a	Levers that always conserve the effort.
b	Levers that not conserve the effort.
c	Levers that sometimes conserve the effort.
d	A fixed point that a rigid bar sits on.
e	A rigid bar rotates around a fixed point, and is affected by a force and a fixed resistance.

## 2 Put (✓) or (X) in front of each of the following sentences, and correct the false ones:

1. The first class levers have the resistance between the force and the fulcrum. ( )
2. The second class levers have the force between the resistance and the fulcrum. ( )
3. The third class levers have the fulcrum between the force and the resistance. ( )
4. The crowbar is an example of the first class levers. ( )
5. If the arm of the force is smaller than the arm of the resistance, then the lever conserves the effort. ( )

## 3 Complete the following sentence:

1. The nutcracker is an example of the ..... levers.
2. The manual broom is an example of the ..... levers.
3. The scissors are an example of the ..... levers.
4. The force  $\times$  its arm = .....  $\times$  .....
5. The type of the levers where the arm of the force and the arm of resistance are equal is .....



## Worksheets &amp; Exams

4 Compare between the three types of levers using the following table:

Points of comparison	First class levers	Second class levers	Third class levers
Definition			
Conservation of effort			
Examples			

5 Classify the following items according to the type of lever:



a. ....



b. ....



c. ....



d. ....



e. ....



f. ....

6 The force affecting a second class lever equals 200 Newton and the length of its arm is 50 cm and has a resistance with a value of 100 Newton; calculate the value of the arm of the resistance.

.....

.....

7 The arm length of a third class lever is 5 cm, and the length of the arm of the resistance is 15 cm. If the resistance has a value of 300 Newton, calculate the value of the affecting force.

.....

.....





GEM

## General Tests on Unit

1

Answer Guide P. 17

(Total mark: 20)

## Test 1

## 1 A) Put (✓) or (X) in front of the following sentences:

(5 marks)

1. The force lies between the resistance and the fulcrum in the first class levers. ( )
2. The resistance lies between the force and the fulcrum in the second class levers. ( )
3. Crowbar is a first class lever. ( )
4. A lever saves efforts when the arm of the force is longer than the arm of the resistance. ( )
5. The fulcrum lies between the force and the resistance in the third class levers. ( )
6. The lever balances when the product of "effort force x its arm" is equal to the product of "resistance force x its arm". ( )

## B) Give a reason for each of the following:

1. Levers are very important in our daily life.

.....

.....

.....

2. Manual broom doesn't have a mechanical benefit.

.....

.....

.....

## 2 A) Complete the following sentences:

(5 marks)

1. The only type of levers where the arm of force and the arm of resistance are equal is .....
2. Scissors are from the ..... class levers.
3. The force arm is the distance between ..... and .....



GEM / Science / Primary 6

13



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## Worksheets &amp; Exams

**B) A first class lever is affected by 10 Newton force with an arm of 10 cm length and a resistance of 20 Newton.**

1. Calculate the length of the arm of resistance.

.....  
 .....

2. Does the lever save effort? Why?

.....  
 .....

**3 A) What happens when ...?**

(5 marks)

1. The effort force is less than the resistance force.

.....

2. The effort force is equal to the resistance force.

.....

**B) Write the scientific term:**

1. The type of levers, where the effort force is always smaller than the resistance force.

(.....)

2. The lever which provides accuracy in performance.

(.....)

3. The most popular type of levers in our daily life.

(.....)

**4 A) Correct the underlined words:**

(5 marks)

1. Bottle opener is an example of the third class levers.

2. The human arm is from the second class levers.

3. The first class levers always have no mechanical benefits.

4. Coal holder is an effort-saving lever.

**B) A third class lever with a force arm of 0.5 meter length, and a resistance arm of 15 cm length. If the resistance equals 200 Newton, calculate the affecting force on the lever.**

.....  
 .....



(Total mark: 20)

## Test 2

## 1 A) Write the scientific term for each of the following:

(5 marks)

1. The type of levers that sometimes save effort. (.....)
2. The force that is exerted by a person to equilibrate the resistance force. (.....)
3. A lever where the fulcrum lies between the force and the resistance. (.....)
4. The distance between the resistance force and fulcrum. (.....)

## B) Give a reason for each of the following:

1. The second class levers always save effort.

.....

2. The third class levers don't save effort.

.....

## C) The length of the force arm of a first class lever is 5 cm and the length of the arm of resistance is 20 cm. If the resistance has a value of 200 Newton, calculate the value of the affecting force.

## 2 A) Complete the following sentences:

(5 marks)

1. Some levers allow increasing the speed of objects we inflict on as in .....
2. If the force arm is longer than the resistance arm, then the force is ..... than resistance.
3. The ..... class levers are the levers where the force arm can be equal to the resistance arm.
4. Balance and seesaw are considered examples of .....

## B) Determine which of the following levers saves effort and why:



1. ....

2. ....

3. ....



## Worksheets &amp; Exams

## 3 A) Choose the correct answer:

(5 marks)

- The lever that has the fulcrum between the force and resistance is .....
  - wheelbarrow
  - soda water opener
  - seesaw
  - ice holder
- All levers and machines .....
  - are made of the same substances
  - have a fixed point called the fulcrum
  - are similar in shape and size
  - do not have specific functions
- All the following are levers that save effort except the .....
  - crowbar
  - nutcracker
  - wheelbarrow
  - ice holder
- The lever saves effort when .....
  - the arm of force = the arm of resistance
  - the arm of force is longer than the arm of resistance
  - the arm of force is shorter than the arm of resistance
  - force = resistance

## B) What is meant by ...?

1. Lever.

2. The law of levers.

## 4 A) Put (✓) or (X) in front of each sentence:

(5 marks)

- The fulcrum of any lever is always between the effort force and the resistance force. ( )
- The third class levers never save effort. ( )
- Effort force is measured in kilogram. ( )

## B) What happens if ...?

1. The force arm is shorter than the resistance arm.

2. We don't have levers.



Unit OneLesson OneTypes of LeversComplete the following statements:

- 1-.....is considered one of the first simple machines which were invented in the past.
- 2-the lever is a.....that rotates around a fixed point called fulcrum.
- 3-the lever is a rigid bar that rotates around a fixed point, and is affected by ..... and .....
- 4-Any lever consists of .....and.....and.....
- 5-Levers help us to perform tasks more easily by .....
- 6-.....,.....,and ..... Is from the importance of levers.
- 7-.....is an example of levers used to increase force, while .....is an example of levers used to increase distance.
- 8-.....is an increasing speed lever.
- 9-.....is a lever used to avoid danger.
- 10-levers like ..... and .....use a small effort to move a heavy load.
- 11-..... and ..... are from first class lever.
- 12-In the second class lever the resistance is found between .....and .....
- 13-..... and ..... are from second class levers.
- 14-In the first class lever the fulcrum is found between .....and.....
- 15-Stapler and wheel barrow is from the ..... Class levers.
- 16-.....and .....are from the third class levers.
- 17-The nutcracker is from the .....levers.



18-The manual broom is from the .....levers.

19-The crowbar is considered from the .....class lever ,while the wheelbarrow is from.....class

**complete:**

1- materials that allow the flow of electricity through them are called .....

2- .....and .....are examples for materials that are electric conductors

3-there are two types of injuries resulting from the improper use of electricity which are .....and .....

4- the .....lead to destroying the tissues of the body

5- electric cables are covered with .....materials

6- you can not put out the electric fires with water , because water is .....

7- .....and ..... are from precautions to deal with electricity

8- .....and ..... are some of the causes of the burns that resulted from electricity



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**correct underlined word :**

- 1- electric fire occurs due to the passage of the electric current through the human body
- 2- fires resulted from electricity are extinguished by water
- 3- electric conductors make the circuit open when they are connected to the circuit
- 4- the human body is good conductor of electricity as it contains gases
- 5- touching the naked wires that has an electric current leads to electric fires

**write the scientific term :**

- 1- a danger that occurs when a part of your body touches a wire that has an electric current but the other part touches a material that is a good conductor of electricity
- 2- materials that allow the electric current to pass through them
- 3- materials that don't allow the electric current to pass through them
- 4- fires occur as a result of the increase in the temperature of the electric machines
- 5- a form of energy that is used in operating some machines as television and washing machines



**give reason for :**

1- Not placing flammable materials close to the electric machines that generating heat

.....

.....

.....

.....

2- electric wires are made of copper

.....

.....

3- doon't place any metallic object inside the socket

.....

.....

4- pushing the injured by anything that is non-conducting of electricity such as a piece of wood

.....

.....

.....

.....



what happens when ?;

1- electricity is not handled cautiously

.....  
.....

2- the spark resulting from the electric fires touches any part of your body

.....  
.....

3- the electric fires are put out by water

.....  
.....

4- you place an electric heater close to furniture or carpets

.....  
.....

5- plugging several electric machines in the same electric socket

.....  
.....



mention som of the important precautions when dealing with electricity

.....

.....

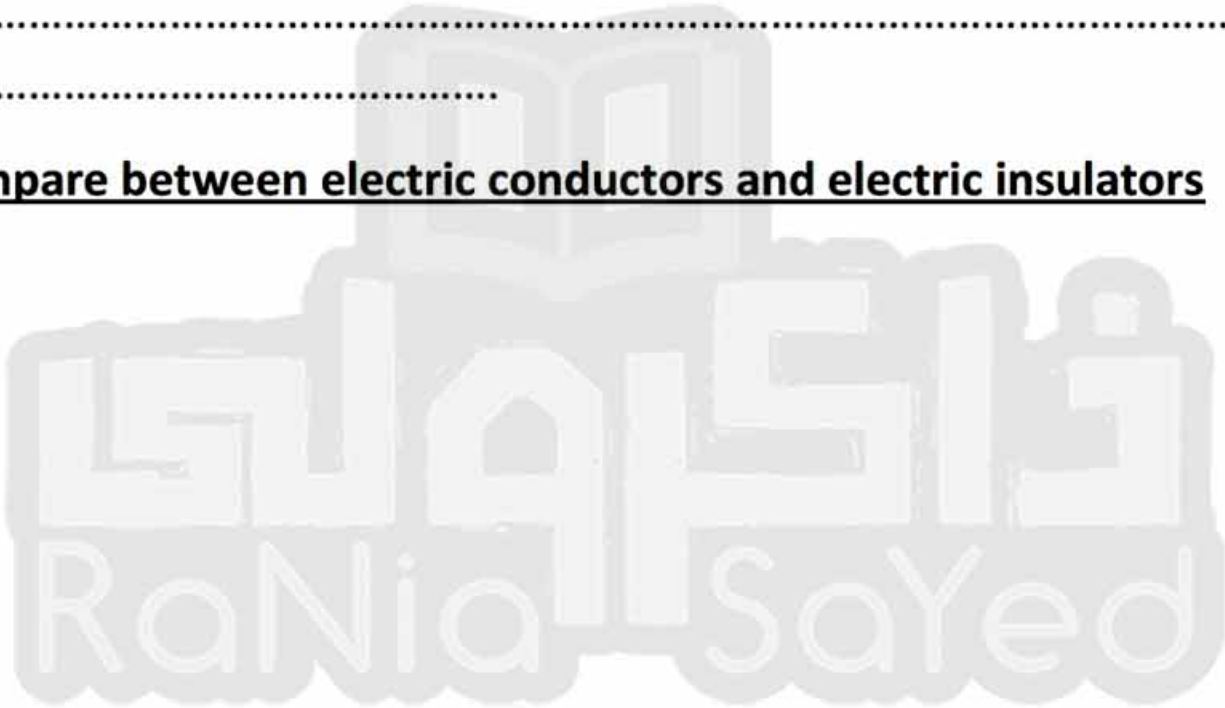
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compare between electric conductors and electric insulators





Lesson TwoLaw of Levers1-Complete the following statements :

1-The law of Levers states that

.....

2-The distance between fulcrum (o) and resistance (R) is called

.....

3-Force  $\times$  its arm = .....  $\times$  .....

4-The lever doesn't conserve effort when.....arm is shorter than  
.....arm.

5-The effort force is larger than the resistance force when .....is  
longer than .....

6-There is a conservation of effort in the first class levers if .....is  
longer than.....

7-The effort force is measured in .....

8-The force arm and the resistance arm are equal in levers  
if.....

9-When the effort force equals 20 newton, resistance is 8 newton and the  
effort force arm=4 cm, so resistance arm =.....

10-The second class levers have mechanical benefits , because  
.....is longer than .....

11-In stapler and nutcracker, the ..... is longer than .....

12-Tweezers and coal holder doesn't have mechanical benefit  
because..... is shorter than.....



13-The type of lever that always conserve effort is ..... while the type of lever that sometimes conserve effort is.....,while the type of lever that never conserve effort is .....

14-The third class levers have ..... arm longer than .....

### Give reason for:

1-The crowbar save effort .

.....  
.....

2-Sometimes the first class levers conserve effort.

.....  
.....

3-The third class lever never save effort.

.....  
.....

4-In the second class lever the force is always less than the resistance.

.....  
.....

5-In spite of the importance of the coal holder ,it is from the levers that doesn't save effort

.....  
.....



**Write the scientific term of the following:**

- 1-They are simple machines that always save efforts (.....)
- 2-A type of levers that effort force may be larger or smaller than the resistance force (.....)
- 3-A type of levers that never save effort (.....)
- 4-A type of levers where the effort arm is always shorter than the resistance arm (.....)
- 5-The distance between the effort force and the fulcrum (.....)

**Put  $\checkmark$  in front of right statements and  $\times$  in front of the wrong ones ,then correct it:**

- 1-The resistance arm is the distance between the resistance and the fulcrum ( )
- 2-If the arm of force is shorter than the arm of resistance , the lever save effort ( )
- 3-The effort force is measured in cm or metre( )
- 4-In the third class lever ,the arm of force may be equal to the arm of resistance ( )
- 5-Manual broom and tweezers have mechanical benefits( )
- 6-In the nutcracker , the effort arm is shorter than the resistance arm ( )
- 7-The first class lever always save effort ( )
- 8-The soda opener , the resistance force is smaller than the effort force ( )



**Solve the following problems:**

1-The exerted force of the first class lever equals 500 Newton ,and the length of its arm is 20 cm ,it is affected by a resistance with the value of 200 Newton .Find the length of the arm of the resistance.

.....

.....

2-The affecting force on a second class lever equals 200 Newton , and the length of its arm is 50 cm. If the value of the resistance 1000 Newton ,Calculate the value of the resistance arm.

.....

.....

3-A Force of 480 Newton affects a lever and o the length of the force arm is 40 cm, if the length of resistance arm is 60 cm , calculate :

1-The value of the resistance that regains the balance of the lever .

.....

2-From the previous answer , complete the following statement:

This lever .....effort ,and it considered from the .....or  
.....class levers.

4-A force of 500 Newton affects a lever of the first order and its force arm is 20 cm . calculate the resistance given that the arm of the resistance equals 50 cm.

.....

.....



5-A force of 500 Newton affects a first class lever and its arm of force equals 10 cm , the resistance equals 200 Newton and its arm of resistance equals 20 cm .in this example is the lever in state of balance or not and why?

.....

.....

### What happens when:

1-The force arm and the resistance arm are equal.

.....2-The force arm is longer than the resistance arm.

.....

3-The resistance arm is longer than the effort arm.

.....

4-The effort force is longer the resistance force.

.....

5-The resistance force is larger the effort force.

.....



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## Unit (1)

### Lesson (1) Types of levers

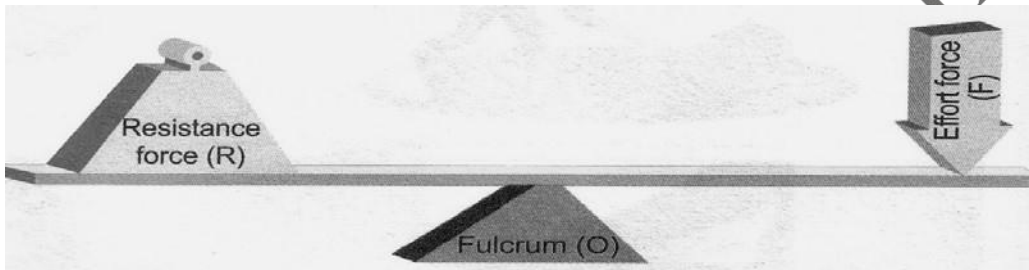
#### **Definition of levers:**

- Is a rigid bar (strong stalk) that rotates around a fixed point called fulcrum, and is affected by a force and a resistance.
- Levers were first described in the year 260 B.C by the Greek scientist Archimedes. Give reasons:

☒ **Along time ago, man invented many simple machines?**

To help him perform heavy tasks more easily.

#### **The structure of levers:**



- ✓ The fulcrum: The fixed point that the bar rotates on.
- ✓ The rigid bar: May be straight or curved.
- ✓ The effort: The force exerted by a person to overcome the resistance.
- ✓ The resistance: The force resulted from the body we want to move.

#### **The function of levers:-**

##### **1- Increasing force:**

Some levers allow the conservation of the effort exerted by using small force

**Like:**

**Nutcracker – Crow bar**

3.Wheelbarrow



1.Crowbar



2.Nutcracker





### Increasing the distance:

Some of levers allow exerting a force for a small distance to make an object move a longer distance.

#### **Like: The manual broom:**

Your hand moves small distance at the upper part of the broom, while the lower part moves a longer distance.

#### **3- Increasing speed:**

Making the body moves faster.

#### **Like the hockey bat.**

#### **4- Moving the force from place to another.**

Like: the manual broom to move the force downwards without bending.

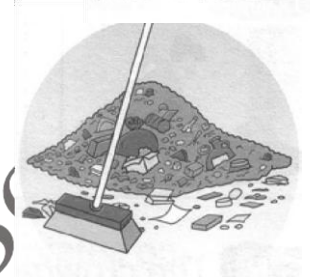
#### **5- Accuracy in performance.**

Like: using tweezers to pick up very small objects.

#### **6- Avoid dangers, like heat, cold, poisonous materials.**

Like the coal holder.

Discover the importance of the lever.



The machine	Importance	Function
Ice holder Coal holder	Protecting hands	Avoid risks
Tweezers	Capturing very small objects	Increasing accuracy in performance.
A broom	Cleaning floors	Transferring force without bending.
Hockey stick	Moving the ball without bending.	Increasing the speed.
Nutcracker	Cracking nuts.	Increasing the force
Bottle opener	Opening bottles	
Pincer	Cutting wires	
Suction pump	Pumping water	
Crow bar	Separating tool	



## Worksheet

### **1-Complete the following:**

- 1- ..... are the most common simple machines that help us to make tasks easily.
- 2- Crowbar, seesaw and wheelbarrow are types of simple machines called.....
- 3- .....is a rigid bar that rotates around ....., and is affected by .....and an effort force.
- 4- In the lever, the fixed point (fulcrum) is symbolized by... ..... while resistance force is symbolized by .....
- 5- .....is results from the body that we want to move it.
- 6- .....is exerted by a person to equilibrate the resistance force. 7- Levers help us to perform tasks more easily by .....and.....
- 8- .....,.....and .....are the importance of levers.
- 9- .....
- 10- .....is example of levers that used to increase force, while .....is an example of levers that used to increase the distance.
- 11 is an increasing speed levers.
- 12 is a very accurate lever.

### **2-Write the scientific term:**

- 1- The fixed point of a rigid bar.
- 2- A rigid bar that rotate around a fixed point and affected by an effort force and resistance.

### **3- Give reasons:**

- 1- Crow bar is considered an increasing force lever.

.....

- 2- Tweezers is considered accurate lever.

.....

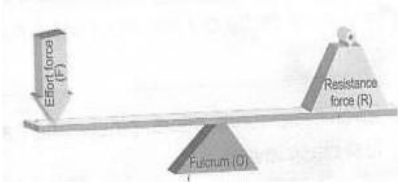


- 3- Levers are very important in our daily life.

.....



## Types of levers

*Levers are classified according to the position of resistance, fulcrum and effort.*

1 <sup>st</sup> Class lever	2 <sup>nd</sup> Class lever	3 <sup>rd</sup> Class lever
		
<b>The Fulcrum is between the Effort and the Resistance.</b>	<b>The Resistance is between the Effort and the Fulcrum.</b>	<b>The Effort is between the Resistance and the Fulcrum.</b>
<ul style="list-style-type: none"> <li>- See – Saw</li> <li>- Crow bar</li> <li>- Scissors</li> <li>- Water pump</li> <li>- Boat arms</li> <li>- Pincer</li> <li>- Hammer</li> <li>- Scale – Balance</li> </ul>	<ul style="list-style-type: none"> <li>- Wheel barrow</li> <li>- A bottle opener</li> <li>- Nut cracker</li> <li>- stapler</li> </ul>	<ul style="list-style-type: none"> <li>- Fish pale</li> <li>- Manual broom</li> <li>- Ice holder</li> <li>- Tweezers</li> </ul>

### Remember





## Worksheet

### 1-Complete the following:

- 1-are levers that have fulcrum between the effort force and the resistance force.
- 2- .....and.....are examples of the first class levers. 3- .....are levers that have the resistance force between effort force and fulcrum.
- 4- .....and..... are examples of the second class levers.
- 5- Stapler and wheelbarrow have the .....between fulcrum and.....
- 6- .....and..... are examples for third class levers.
- 7- The nutcracker is an example of the ..... levers.
- 8- The manual broom is an example of the.....levers.
- 9- The scissors is an example of the.....levers.

### 2- Give reasons:

- 1- Crowbar, suction pump and paddle are first class levers.

.....

- 2- Bottle opener and stapler are second class levers.

.....

- 3- Hockey bat and fishing tool are third class levers.

.....

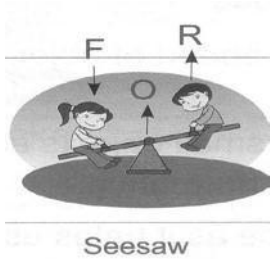
### 3- Classify the following levers:

**Crowbar – Nutcracker – Wheelbarrow – Bottle opener – Suction pump – paddle – Balance – Scissors – pincer – plier – Stapler – fishing tool – tweezers – hockey bat – ice holder – Manual broom.**

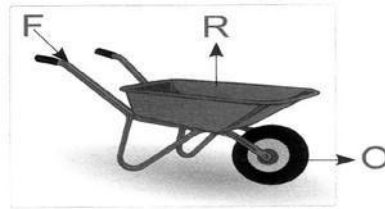
First class lever	Second class lever	Third class lever
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....



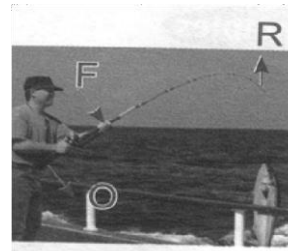
## Lesson (2) Law of Levers



Seesaw



Wheelbarrow



Fishing tool

From the previous pictures, we conclude that any lever has:

- 1- Force (F)
- 2- Resistance (R)
- 3- Fulcrum (o)
- 4- Effort arm.
- 5- Resistance arm.

✗ The force arm:-

The distance between the force and fulcrum.

✗ The resistance arm:-

The distance between the resistance and fulcrum.

❖ The law of levers:-

**The force x its arm = The resistance x its arm**

The effort force or resistance force is inversely proportional to its arm.

**a) When the arm of force = The arm of resistance**

- The force and the resistance are equal.

$$\text{Force} = \text{Resistance} \implies \text{Force arm} = \text{Resistance arm.}$$

**b) When the arm of force is larger than the arm of resistance**

- the force is smaller than the resistance.

**And the lever conserves the effort.**

$$\text{Force} < \text{Resistance} \implies \text{Force arm} > \text{Resistance arm.}$$



**c) If the arm of force is shorter than the arm of resistance.**

The force is longer than the resistance.

The lever doesn't conserve the effort.

**Force > Resistance  $\implies$  Force arm < Resistance arm.**

**Worksheet**

**1- Complete the following:**

- 1- The law of levers states that.....
- 2- The arm of force is the distance between .....and.....
- 3- Force arm X its arm = .....X.....
- 4- When the force arm equals 5 m. and the resistance arm equals 1 m. so .....is larger than.....
- 5- The effort force is.....proportional to its arm.
- 6- The effort force is measured by .....
- 7- The resistance arm is measured by .....
- 8- The force and resistance are equal in levers if.....
- 9- The effort force is larger than the resistance force when..... is longer than.....

**Examples:-**

**1- Study the figure then calculate the weight of the rock.**

**The answer:**

**Force x its arm = resistance x its arm**

**$10 \times 6 = \text{Resistance} \times 2$**

**\* Resistance =  $60 \div 2 = 30$  Newton**

**2- Second class lever, force = 200 Newton. Force arm = 5 cm, calculate the resistance arm, When the resistance = 100 N.**

**Force x its arm = Resistance x its arm**

**$200 \times 5 = 100 \times \text{Resistance arm}$**

**\* Resistance arm =  $1000 \div 100 = 10$  cm**

**3- Lever affected by 500 Newton force and arm length is 20 meter and also affected by 1000 Newton resistance, and its arm length is 5 m , is the lever at equilibrium? And why?**

The lever is in equilibrium when the lever law is established:

Force x its arm =  $500 \times 20 = 10000$  Newton. Meter

Resistance x its arm =  $1000 \times 5 = 5000$  Newton. Meter

Science the two magnitudes are not equal.

The lever is not at equilibrium.



### Problems

1- The exerted force of the first class lever equals 500 Newton and the length of its arm is 20 cm. and is affected by a resistance with a value of 200 Newton, find the length of the arm of the resistance.

.....

.....

.....

2- The length of the force arm of a first class lever is 5 cm. and the length of resistance arm is 15 cm. if the resistance has a value of 300 Newton, calculate the value of effort force.

.....

.....

.....

3- The affecting force on a second class lever equals 200 Newton and the length of its arm is 50 cm. if the value of the resistance 1000 Newton calculates the value the resistance arm.

.....

.....

.....

.....

Geel 2000 Language Schools


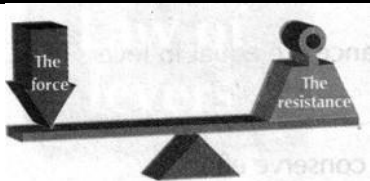



### What are the levers that conserve effort:-

The lever conserves effort if the force is smaller than the resistance.  
And the force arm is more than the resistance arm

### First class levers:-

As the fulcrum lies at the middle, we have three possibilities:-

<b>The <u>Force arm</u> is larger than the <u>Resistance arm</u></b>	<b>The <u>force arm</u> is equal to The <u>resistance arm</u></b>	<b>The <u>Force arm</u> is shorter than the <u>Resistance arm</u></b>
		
<b>The lever conserves effort. Has mechanical benefit. The force is smaller than resistance.</b>	<b>The force is equal to resistance. The lever doesn't solve effort. No mechanical benefit.</b>	<b>The force is larger than the resistance. The lever doesn't conserve effort. Has no mechanical benefit.</b>

## Worksheet

### G.R.

The force and resistance can be equal only in the first class levers.

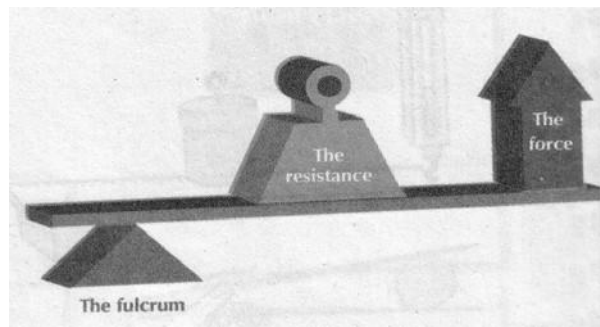
.....

### 1- Complete:

- 1- The lever conserves effort when.....is longer than.....
- 2- The only type of levers, where the arm of force and the arm of resistance are equal is the.....
- 3- There is a conservation of effort in the first class levers if.....is longer than.....or when.....
- 4- In the first class levers, when the effort force is ..... the resistance force, the lever has a mechanical benefit.



## The second class lever:-



### G.R

1- It always conserves effort and has mechanical benefit.

Because the force arm is always larger than the resistance arm.

2- The force doesn't equal the resistance in the 2<sup>nd</sup> class lever.

3- In the 2<sup>nd</sup> class lever, the force is always less than the resistance.

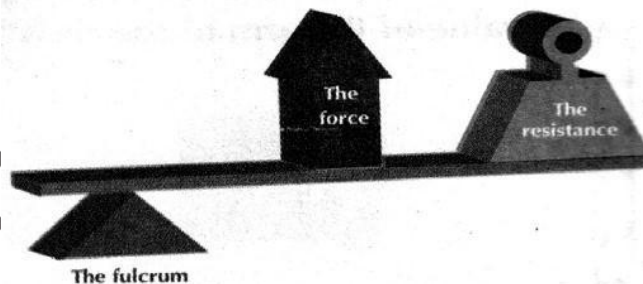
### 1- Complete the following:

1- The second class levers have a mechanical benefit, because .....is longer than .....

2- Wheelbarrow has a mechanical benefit as it is .....

3- In stapler and nutcracker, the.....is longer than.....

## The 3<sup>rd</sup> class lever:-



### G.R ✓ The 3rd class lever doesn't conserve effort, have no mechanical benefit

Because, the arm of resistance is larger than the arm of the force, so the effort force is always larger than resistance.

- The machines that doesn't conserve effort are useful to increase speed, distance and to save time.



## Worksheet

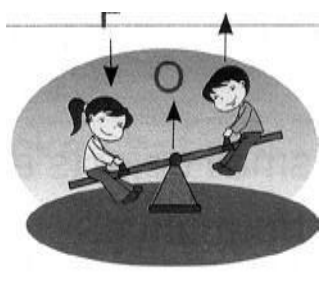
### A) Complete:

- 1- Tweezers and claw hammer haven't mechanical benefit, because .....is shorter than.....
- 2 ..... don't conserve effort, because the arm of resistance is always longer than the arm of effort force.
- 3- In the ....., the effort force is always smaller than resistance force, while in the....., the effort force is always larger than the resistance.
- 4- The type of levers which sometimes saves effort and another times doesn't is the .....
- 5- In hockey bat, .....is smaller than ....., while in the soda water opener, the .....is longer than.....

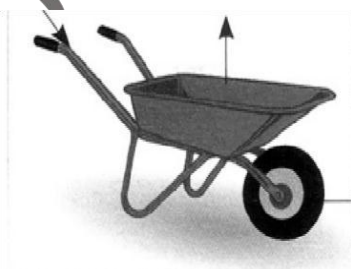
### B) Give reason for:

- 1- The third class levers are very important in our life although they don't conserve effort.  
.....
- 2- The third class levers always don't conserve effort.  
.....

### C) Classify the following levers according to the conservation of effort, and then mention the type of lever.



Seesaw



Wheelbarrow

2. Nutcracker





## **Lesson 1 Worksheet 1**

### **1. choose the correct answer :**

**1. the most common simple machines are .....**

- a. levers      b. bicycles      c. car machines      d. (a) ,( b) and ( c)**

**2. the lever rotates around a fixed point called .....**

- a. resistance force      b. fulcrum**  
**c. effort force      d. a rigid bar**

**3. levers were first described in 260 B.C by the Greek scientist.....**

- a. Archimedes      b. el-Hassan Ibn el - Haitham.**  
**c. Newton .      d. Mendel .**

**4. the levers that have the fixed point (fulcrum ) between the resistance force and effort force are .....**

- a. first class levers.      b. third class levers .**  
**c. second class levers.      d.(a) ,(b)and ( c)**

**5.....have the resistance force between the effort force and fulcrum**

- a. third class levers      b. first class levers**  
**c. second class levers      d. (a),( b) and ( c)**

**6. ....is a lever from the third class levers .**

- a. sweet holder      b. scissors      c. nutcrackers      d. nail clippers**

**7. all the following are from the first class levers except.....**

- a. the crowbar .      b. the scissors**  
**c. nutcrackers      d. the seesaw.**

**2. Give reason for :**

**1. some levers save effort**

.....

**2. bottle opener and stapler are second class lever**

.....

**Lesson 1 Worksheet 2**

**1. choose the correct answer :**

**1. crowbar is considered from .....class levers .**

**a. first                      b. second                      c. third                      d. fourth .**

**2. ....have the effort force between the resistance force and fulcrum .**

**a. third class levers .    b. first class levers .**

**c. second class levers .    d. ( b) and ( c) .**

**3.the ..... force is exerted by a person to equilibrate the resistance**

**a. fulcrum.              b. effort .              c. friction .              d. (a)and ( b).**

**4. any lever consists of .....**

**a. a resistance force (R ).    b. an effort force (F)**

**c. a fulcrum (O) .    d. (a), ( b)and (c)**

**5. all the following are from the importance of levers except.....**

**a. increasing speed .    b. increasing force**

**c. increasing size .    d. accuracy in performance.**



6. ....increases the speed of objects that we affect them.

a. manual broom .

b. seesaw.

c. hockey bat .

d. coal holder.

7. tweezers are used to .....

a. move a heavy load .

b. increase the speed of the ball

c. pick up very small objects .

d. hold the cold materials.

**2.write the scientific term :**

1. the fixed point f a rigid bar on which the bar rotates ( )

2. levers that have the resistance force between the effort force and the fixed point ( )

## Lesson 2 Worksheet 1

choose the correct answers :

1. the law of levers states that .....

a.  $\text{force} \times \text{its arm} = \text{resistance} \times \text{its arm}.$

b.  $\text{force} \div \text{its arm} = \text{resistance} \div \text{its arm} .$

c.  $\text{force} + \text{its arm} = \text{resistance} + \text{its arm} .$

d.  $\text{force} \times \text{its arm} = \text{resistance} + \text{its arm}.$

2. a force whose value equals 50 Newton affects a lever of the second class that its force arm = 20 cm . calculate the resistance force ,where its resistance arm = 5 cm .

a. 200 N

B. 20 N

C. 1000 N

D. 10 N

3. when the arm of force is longer than the arm of resistance , the effort force is .....the resistance .

a. larger than .

b. smaller than

c. equal to

d. double

4. the value of effort and resistance in the lever depend on .....

a. the arm of force

b. the resistance arm .

c. the position of fulcrum .

d. (a) and ( b)

5. the type of levers which always does not save effort is the .....

a. first class levers .

b. third class levers .

c. second class levers .

d. fourth class levers .

6. the effort force and resistance force are measured in .....

a. Newton.

b. meter.

c. centimeter.

d. hertz.



**Give reason :**

**1. When the force arm is longer than the resistance arm , the lever conserves effort**

**2.the third class levers always do not conserve effort**

**Problem :**

**1. A third class lever, where the effort force = 200 newton, the force arm = 5cm and the resistance force = 100 newton calculate the length of the resistance arm.**

**2. in the second class lever , the effort force is 100 newton , length of force arm = 25 cm and the resistance = 500 newton calculate he resistance arm**

**Lesson 2 Worksheet 2**

**choose the correct answers :**

**1. force arm is sometimes equal to resistance arm in .....class levers ,**

**a. first .                      b. second .                      c. third .                      d. first and second .**

2. when the effort arm equals 5 cm and the resistance arm equals 10 cm so .....

- a. the type of lever may be a first class lever .
- b. the effort force is larger than the resistance force .
- c . the type of lever may be a third class lever .
- d. (a ) .(b) and (c).

3. which of the following levers saves effort ?.....

- a. scissors
- b. nutcrackers .
- c. fishing tool .
- d. sweet holder.

4. which of the following levers does not save effort ?.....

- a. coal holder .
- b. nutcrackers
- c. wheelbarrow.
- d. bottle opener

5. which of the following levers has the arm of force longer than the arm of resistance ?.....

- a. manual broom .
- b. ice holder.
- d. soda water opener .
- d. tweezers .

**2. write the scientific term :**

1. the distance between the effort force and the fulcrum ( )

2. a force that increases when the effort force arm is shorter than the resistance arm ( )





# February Revision

## \* (1) Choose the right answer:

**Mr. Ahmed Elbasha**

**1. Lever that has the fulcrum between the force and the resistance .....**

- a. wheelbarrow.      b. seesaw.      c. nutcracker.      d. tweezers.

**2. In second class lever if the distance between resistance and fulcrum 15 cm ,so the distance between effort force and fulcrum may equal .....**

- a. 5 cm.      b. 20 cm.      c. 15 cm.      d. 10 cm.

**3. From the second class lever is .....**

- a. sweet holder.      b. crowbar.      c. nutcracker.      d. seesaw.

**4. .... is a fixed point that a rigid bar rotates on.**

- a. Resistance      b. Force      c. Fulcrum      d. Lever

**5. .... is a type of lever that always save effort.**

- a. First      b. Second      c. Third

**6. .... is considered from the third class levers.**

- a. Fishing hook      b. Seesaw      c. Bottle opener

**7. From the levers that are used to avoid danger is .....**

- a. coal holder.      b. scissors.      c. seesaw.      d. wheelbarrow.

**8. All the following levers don't save effort except .....**

- a. ice holder.      b. hockey bat.      c. nutcracker.

**9. Force arm is sometimes equal to resistance arm in ..... class lever.**

- a. first      b. second      c. third

**10. .... is/are used to pick up very small objects.**

- a. Coal holder      b. Tweezers      c. Manual broom      d. Seesaw

**11. When fulcrum is between effort force and resistance so the lever is ..... lever.**

- a. first      b. second      c. third

**12. Levers were first described by the Greek scientist .....**

- a. Archimedes.      b. Newton.      c. Edison.      d. Galileo.

**13. The arm of resistance in the ..... class lever may be equal effort arm.**

- a. first      b. second      c. third

**14.The force arm is sometimes equal to the resistance arm in the ..... class.**

- a. first                                      b. second                                      c. third

**15.Which of following used to avoid dangers .....**

- a. coal holder.                                      b. wheelbarrow.                                      c. manual broom.                                      d. scissors.

**16..... is from a second class levers.**

- a. Scissors                                      b. Wheelbarrow                                      c. Manual broom

**17..... is an example of first class levers.**

- a. Crowbar                                      b. Bottle opener                                      c. Manual broom

**18.Fishing tool and tweezers are considered as ..... class levers.**

- a. first                                      b. second                                      c. third

**19.Force x its arm = Resistance x its arm is the law of .....**

- a. energy.                                      b. electricity.                                      c. levers.

**20..... is considered from third class levers.**

- a. Fish hook                                      b. See-saw                                      c. Nutcracker

**21..... is a fixed point of a rigid bar on which the bar rotates.**

- a. Fulcrum                                      b. Force of resistance                                      c. Force of effort

**22.Lever that have the force between the resistance and the fixed point .....**

- a. first class levers.                                      b. second class levers.                                      c. third class levers.

**23..... class levers always do not conserve the effort.**

- a. First                                      b. Second                                      c. Third

**24.The lever conserves effort if the arm of force is ..... the arm of resistance.**

- a. longer than                                      b. equal to                                      c. smaller than

**25.Lever that has the fulcrum between the force and the resistance .....**

- a. wheelbarrow.                                      b. soda-water opener.                                      c. see-saw.

**26.The distance between the resistance and the fulcrum is known as the arm of .....**

- a. force                                      b. resistance                                      c. lever

**27.Seesaw is from ..... class levers.**

- a. first                                      b. second                                      c. third

**28.Effort force arm is always bigger than resistance arm in the ..... class levers.**

- a. first                                      b. second                                      c. third



**✱ (2) Write the scientific term :**

- 1) Levers at which the resistance lies between force and fulcrum (.....)
- 2) The fixed point of a rigid bar on which the bar rotates (.....)
- 3) Type of levers doesn't save effort (.....)
- 4) A type of lever that sometimes conserves effort (.....)
- 5) A rigid bar rotates around a fixed point, and is affected by a force and a resistance (.....)
- 6) The lever that scissors is one example. (.....)
- 7)  $\text{Force} \times \text{Its arm} = \text{Resistance} \times \text{Its arm}.$  (.....)
- 8) The type of levers that always conserve effort (.....)
- 9) A type of lever in which the arm of force may be equal the arm of resistance (.....)
- 10) The type of levers that its mid-point is the effort force. (.....)
- 11) Greek scientist who invented the lever (.....)
- 12) Levers that have the effort force between the resistance and the fulcrum (.....)
- 13) Type of levers that always doesn't save effort. (.....)
- 14) It's the measuring unit of resistance and force of effort. (.....)
- 15) The type of levers that have the fulcrum between the force of effort and the resistance. (.....)
- 16) The fixed point at which the lever rotates around. (.....)

**\*(3) Complete the following :**

1. The fixed point where the rigid bar rotates on is called .....
2. Levers were first described by a scientist whose name is .....
3. The crowbar is considered a ..... class lever.
4. Crowbar is considered from levers of ..... class, while the manual broom is considered from levers of ..... class.
5. The distance between the fulcrum and the force is called ....., while the distance between the resistance and the fulcrum is called .....
6. The bottle opener and wheelbarrow are levers of the ..... kind, while the manual broom is levers of the ..... kind.
7. The ..... type of lever always conserves effort, while the ..... type always doesn't conserve effort.
8. The lever doesn't save effort when ..... arm is shorter than the ..... arm.
9. From the second class levers ..... and from the third class levers .....
10. The ..... class levers sometimes save effort.
11. .... is an example of levers that is used to perform tasks accurately
12. In the second class levers, the resistance force is found between the ..... and .....
13. When the force arm is longer than resistance arm, ..... is smaller than .....
14. In the ..... class lever the ..... is between fulcrum and the resistance .
15. Nutcracker is considered an example for ..... class lever.
16. In first class levers, the fulcrum is found between ..... and .....
17. The law of levers states that. ....
18. In the third class levers, the ..... lies between ..... and fulcrum.
19. Sweet holder is an example of ..... levers
20. The lever doesn't conserve effort when ..... arm is shorter than ..... arm.
21. The lever is a rigid bar that rotates around a fixed point called ..... it is also affected by ..... and .....
22. Nutcracker is an example of ..... class lever.



### \*(4) Correct the underlined words:

1	Scissors is a <u>third</u> class lever	( ..... )
2	The <u>first</u> class lever has the resistance between the force and the fulcrum	( ..... )
3	<u>The force</u> is fixed point that a rigid bar sits on	( ..... )
4	Nutcracker is one from the <u>first</u> class lever	( ..... )
5	The <u>scissors</u> is used to increase the speed.	( ..... )
6	The fishing hook is an example on <u>first</u> class levers	( ..... )
7	When the effort force = 20 N , resistance is 8 N and the effort force arm= 4 cm , so the resistance arm= <u>100</u> cm.	( ..... )
8	The force between the resistance and fulcrum in the <u>1<sup>st</sup> class lever</u>	( ..... )
9	The coal holder is used in <u>increasing distance</u>	( ..... )
10	<u>Newton</u> was the first scientist who describe the levers.	( ..... )
11	The <u>third</u> class levers always conserve effort.	( ..... )

### \*(5) Give reason for:

1. Water pump is a first class lever.

.....

2. Sometimes the first class lever saves effort.

.....

3. The second class levers conserve effort.

.....

.....

4. The third class levers don't conserve effort.

.....

5. The nail clipper saves effort.

.....

6. The nutcracker is considered a second class lever.

.....

7. The second class levers have mechanical benefits and conserve efforts.

.....

8. Nutcracker is considered an increasing force lever.

.....

9. Levers are very important in our life.

.....

### ✱(6) What happen if:

1. The effort force is between the resistance force and fulcrum.

.....

.....

2. The resistance arm is longer than the force arm in the lever.

.....

.....

3. Both of force arm and resistance arm equal 10 metres.

.....

.....

4. The force arm and the resistance arm have the same length.

.....

.....

5. The resistance force is larger than the effort force.

.....

.....

6. The resistance lies between force and fulcrum.

.....

.....



**\*(7) Put ( √ ) or ( X ) :**

1. In the second class levers the force arm may be equal to the resistance. (     )
2. Bottle opener is a third class lever. (     )
3. The fulcrum in scissors lies between force and resistance. (     )
4. If the force arm is smaller than the resistance arm, the lever saves effort. (     )
5. The first class levers has the resistance between the force and the fulcrum. (     )
6. The soda water opener is an example of second class lever. (     )
7. Tweezer is a type of 3<sup>rd</sup> class lever. (     )
8. The first class levers always conserve effort. (     )
9. The first man who described the lever was Archimedes. (     )
10. The arm of force is shorter than the arm of resistance in the third class lever. (     )
11. The effort arm is measured in centimetre or metre. (     )
12. Bottle opener is a kind of levers that pick up the very small objects. (     )
13. Water is used to put off electric fires. (     )
14. The second class levers save effort. (     )
15. Arm of force in the third class lever may be equal to resistance arm. (     )
16. The distance between resistance force and fulcrum is called effort force arm. (     )
17. The scientist Newton who invented the light bulb. (     )
18. The manual broom increases the speed. (     )
19. The scissors is a second class lever. (     )
20. In the 3<sup>rd</sup> class levers the force arm may by equal to the resistance arm. (     )
21. In the first class levers, the resistance is between the effort force and fulcrum. (     )

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22.	The distance between resistance and fulcrum is called resistance arm.	(    )
23.	The manual broom is a second class lever.	(    )
24.	The fulcrum always lies between force and resistance.	(    )
25.	Nutcracker and manual broom are considered as third class levers.	(    )
26.	Hockey bat is used to pick up small objects.	(    )
27.	Third class levers save effort.	(    )
28.	The scissors is considered as a third class lever.	(    )
29.	The scissors is an example of the first class levers.	(    )
30.	In second-class levers, the force of resistance is between the force and fulcrum.	(    )
31.	There is one point of connection on each tip of the fluorescent lamp.	(    )
32.	Coal holder is from second class levers.	(    )



## ★(8) Problems :

1

In a lever if the length of the force arm = 4 cm, the length of the resistance force = 6 cm , and the value of the force = 48 N.

**Calculate the value of the resistance**

.....

.....

.....

2

If the exerted force of the first class lever 500 N and the length of its arm is 20 cm. and is affected by a resistance with value of 200 N. **Determine the location of resistance.**

.....

.....

.....

3

**From the opposite figure, answer the following :**

1. What is the type of this lever ?

.....

2. Does it conserve effort ?

.....

3. Which is longer the force arm or the resistance arm ?

.....

4. Give an example for this type of lever ?

.....



4

A balanced first class lever was affected by an effort force 500 Newton and the arm of force 20 cm and was affected by resistance 200 Newton .

**Find the length of the resistance arm.**

.....

.....

.....

.....

5

**Problem :**

The exerted force of the first class lever equals 500 Newton and the length of its arm is 20 cm and is affected by a resistance with a value of 200 Newton. Find the resistance arm.

The law of lever = ..... × ..... = ..... × .....  
 = ..... × ..... = ..... × .....  
 = .....

6

**[A] Match :**

(A)	(B)
1. Third class lever	a. levers that always save the effort.
2. Second class lever	b. levers that never save the effort.
3. Lever	c. levers that sometimes save the effort.
4. First class lever	d. a rigid bar rotates around a fixed point and is affected by a force and a resistance.

1. ....

2. ....

3. ....

4. ....



## Model Answer

### \*(1) Choose the right answer:

1. B	6. A	11. A	16. B	21. A	26. B
2. B	7. A	12. A	17. A	22. C	27. A
3. C	8. C	13. A	18. C	23. C	28. B
4. C	9. A	14. A	19. C	24. A	
5. B	10. B	15. A	20. A	25. C	

### \*(2) Write the scientific term :

1. Second class lever	5. Lever	9. First class lever	13. Third class lever
2. Fulcrum	6. First class lever	10. Third class lever	14. Newton
3. Third class lever	7. Law of levers	11. Archimedes	15. First class lever
4. First class lever	8. Second class lever	12. Third class lever	16. Fulcrum

### \*(3) Complete the following :

1. Fulcrum	7. Second class lever – third class lever	12. Fulcrum – effort force	18. Force – resistance
2. Archimedes	8. Force – resistance	13. Resistance - Force	19. Third
3. First	9. Wheel barrow – fishing tool	14. Third – force	20. Force – resistance
4. First – third	10. First	15. Second	21. Fulcrum – resistance force – effort force
5. Force arm – resistance arm	11. Tweezers	16. Resistance – force	22. Second
6. Second class lever – third class lever		17. $\text{Force} \times \text{it's arm} = \text{resistance} \times \text{it's arm}$	

### \*(4) Correct the underlined words:

1. First	4. Second	7. 10 Cm	10. Archimedes
2. Second	5. Hockey bat	8. 3 <sup>rd</sup> class lever	11. Second
3. Fulcrum	6. Third	9. Avoid danger	

### \*(5) Give reason for:

- Because they have fulcrum between the effort force and the resistance force.
- Because sometimes in the 1st class levers, the effort arm is longer than the resistance arm.
- Because the effort arm is always longer than the resistance arm, so the effort force is always smaller than the resistance force.
- Because the effort arm is always shorter than the resistance arm, so the effort force is always larger than the resistance force.
- Because it is a second class lever that has the effort force smaller than the resistance force.
- Because they have the resistance force between fulcrum and the effort force.
- Because the resistance force is larger than the effort force.
- Because in these levers, we use a small force to make a great effort.
- Because they are used in :
  - Increasing force.
  - Increasing speed.
  - Increasing distance.

### \*(6) What happen if:

- The lever doesn't conserve effort.
- The effort force is larger than the resistance force and the lever doesn't conserve effort.
- The effort force is equal to the resistance force.
- The effort force and the resistance force are equal and this lever doesn't conserve effort.
- The lever doesn't conserve effort.
- The lever saves effort.

### ★(7) Put ( √ ) or ( X ) :

1. ( X )	7. ( √ )	13. ( X )	19. ( X )	25. ( X )	31. ( X )
2. ( X )	8. ( X )	14. ( √ )	20. ( X )	26. ( X )	32. ( X )
3. ( √ )	9. ( √ )	15. ( X )	21. ( X )	27. ( X )	
4. ( X )	10. ( √ )	16. ( X )	22. ( √ )	28. ( X )	
5. ( X )	11. ( √ )	17. ( X )	23. ( X )	29. ( √ )	
6. ( √ )	12. ( X )	18. ( X )	24. ( X )	30. ( X )	

### ★(8) Problems :

(1) -

Force X It's arm = Resistance X It's arm

$$48 \times 4 = \text{Resistance} \times 6$$

$$\text{Resistance} = \frac{48 \times 4}{6} = 32 \text{ cm}$$

(2) -

Force X It's arm = Resistance X It's arm

$$500 \times 20 = 200 \times \text{It's arm}$$

$$\text{Resistance arm} = \frac{500 \times 20}{200} = 50 \text{ cm}$$

(3) -

1. Second
2. yes
3. Force arm
4. nutcracker

(4) -

Force X It's arm = Resistance X It's arm

$$500 \times 20 = 200 \times \text{It's arm}$$

$$\text{Resistance arm} = \frac{500 \times 20}{200} = 50 \text{ cm}$$

(5) -

Force X It's arm = Resistance X It's arm

$$500 \times 20 = 200 \times \text{It's arm}$$

$$\text{Resistance arm} = \frac{500 \times 20}{200} = 50 \text{ cm}$$

(6) -

1 - b

2 - a

3 - d

4 - c



**1} Choose the correct answer**

**1. Fishing tool and tweezers are considered as.....class levers.**

- a. first                                      b. second                                      c. third

**2. The force arm is sometimes equal to the resistance arm in the .....class levers.**

- a. first                                      b. second                                      c. third

**3. is an example of first class lever.**

- a. Scissor                                      b. Nutcracker                                      c. Sweet holder

**4. Force x its arm = Resistance x its arm is the law of .....**

- a. energy.                                      b. electricity.                                      c. levers.

**5. Which of the following levers conserve effort .....**

- a. fishing tool.                                      b. sweet holder.                                      c. wheelbarrow.

**6. Levers of the .....class, sometimes conserve the effort.**

- a. first                                      b. second                                      c. third

**7. An example of the second class lever is the .....**

- a. coal holder.                                      b. wheelbarrow.                                      c. sensitive balance

**8. A lever where the resistance lies between effort force & fulcrum .....**

- a. nutcracker.                                      b. scissors.                                      c. sweet holders.

**9. is from the second class levers.**

- a. Scissors                                      b. Nutcracker                                      c. Coal holder

**10. The first class lever differs that of the second class lever in .....**

- a. the absence of the acted force.  
b. the presence of fixed point to rest on.  
c. the position of the fulcrum.

**11. is a fixed point of a rigid bar on which the bar rotates.**

- a. Fulcrum                                      b. Force of resistance                                      c. Force of effort

**12. Levers that have the force between the resistance and the fixed point .....**

- a. first class levers.                                      b. second class levers.                                      c. third class levers.

**13. The force and resistance are equal in levers, if .....**

- a. force arm is longer than resistance arm.
- b. force arm is shorter than resistance arm.
- c. force arm is equals to resistance arm.

**14. Sometimes the arm of the force equals the arm of the resistance in ..... class**

- a. first
- b. second
- c. third

**15. class levers always do not conserve the effort.**

- a. First
- b. Second
- c. Third

**16. The lever conserves effort if the arm of force is ..... the arm of resistance.**

- a. longer than
- b. equal to
- c. smaller than

**17. Lever that has the fulcrum between the force and the resistance .....**

- a. wheelbarrow.
- b. soda-water opener.
- c. see-saw.

**18. The distance between the resistance and the fulcrum is known as the arm of .....**

- a. force
- b. resistance
- c. lever

**19. Seesaw is from ..... class levers.**

- a. first
- b. second
- c. third

**20. Effort force arm is always bigger than resistance arm in the ..... class levers.**

- a. first
- b. second
- c. third

**21. from the levers which Avoid dangers**

- a. Scissors
- b. Nutcracker
- c. Coal holder

**22. Transferring force from one place to another:**

- a. Manual broom
- b. Nutcracker
- c. Coal holder

**23. from the levers which Catching things accurately.**

- a. Manual broom
- b. Nutcracker
- c. tweezer

**24. from the levers which Increasing speed.**

- a. Manual broom
- b. hokey bat
- c. tweezer

**25. from the which Saving effort.**

- a. Manual broom
- b. hokey bat
- c. wheel barrow

**26. from the which Increasing force.**

- a. Manual broom
- b. Nutcracker
- c. Coal holder



**27. from the which Increasing distance.**

- a. Manual broom      b. Nutcracker      c. Coal holder

## **2} problems**

- 1. In a third class lever, if the length of the force arm equals 5 cm, and the length of resistance arm equals 15 cm. if the resistance equals 300 newton. Calculate the value of effort force.**

.....

.....

.....

.....

- 2. The length of the force arm of a third class lever is 10 cm. and the length of the arm of resistance is 20 cm. find the resistance, if the value of the affecting force is 30 N.**

.....

.....

.....

.....

- 3. Calculate the length of the resistance arm that causes the balance of the lever. If you know that the length of the force arm is 2 cm, the hanging force is 8 Newton and the resistance is 4 Newton.**

.....

.....

.....

.....

## 2} complete the following

1. Ice holder is from ..... class levers.
2. if Effort force arm is equal resistance arm in the... ..... class levers.
3. from the levers which save effort .....,.....
4. ....From levers that increase distance .
5. ....from the levers which used to transferring force .
6. ....from the levers which Increasing speed.
7. ....from the which Saving effort.
8. from the which avoid dangers .
- 9- the distance between the force and the fulcrum is called .....
10. the distance between the resistance and the fulcrum is called .....
- 11-.....Is a fixed point of a rigid bar on which the bar rotates.
- 12-.....A rigid bar rotating around a fulcrum and is affected by the effort force and the resistance force.
- 13-.....Is a type of levers that always save effort.
- 14.....Is a type of levers that never save effort.
- 15.....Is a type of levers that sometimes save effort.
16. .... Is a type of levers where the effort force is always smaller than the resistance force.





#### **4} Answer the following questions :**

1- From the opposite fig.

a) What is the type of this lever is ?

.....

b) Give an example about this lever.

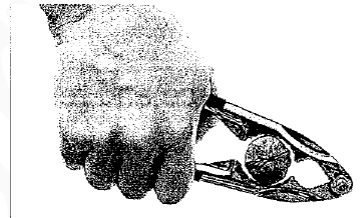
.....



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2- A ) the type of this lever is .....

Second class



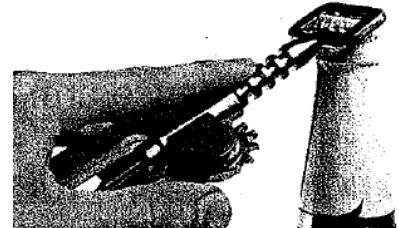
B )what is the importance of this lever .....

Save effort (increase force

---

3- A) the type of this lever is .....

b. second



---

#### **5} Give reason for :**

1-Bottle opener and stapler are second class levers.

.....

2-Nail clipper is a first class lever.

.....

3-Suction pump is a first class lever.

.....

4-The second class levers have mechanical benefits& conserve efforts.

.....

## **model answer**

1-c	13-c	25-c	7-wheelbarrow
2-a	14-a	26-b	8- Coal holder
3-a	15c	27- a	9- arm of force
4-c	16-a	<b>Problems: 1-900</b>	10- arm of resistance
5- c	17-c	2-15	11- fulcrum
6- a	18-b	3-4	12- lever
7-b	19-a	<b>Complete</b> 1-third	13- second class
8-a	20-b	2- first	14- third class
9-b	21-c	3c- Nutcracker, wheelbarrow	15-First class
10-c	22-a	4- Manual broom	16- third class
11-a	23-c	5- Manual broom	
12-c	24-b	6- hokey bat	

### **4} Answer the following questions :**

**a-Second**

**b-Wheelbarrow – nutcracker**

---

a- Second class

b- Save effort (increase force)

---

3-Second

### **5)Answer give reason :**

- 1- Because the resistance is between fulcrum & effort force.
- 2- Because the fulcrum is between effort & resistance.
3. Because the fulcrum is between effort & resistance.
- 4-Because the arm of force is larger than the arm of resistance so force is smaller than resistance.